MODEL 129, 140 as of 1.6.96,
163, 168, 170,
202 as of 1.8.96,
208,
210 as of 1.6.96,
215, 220

General

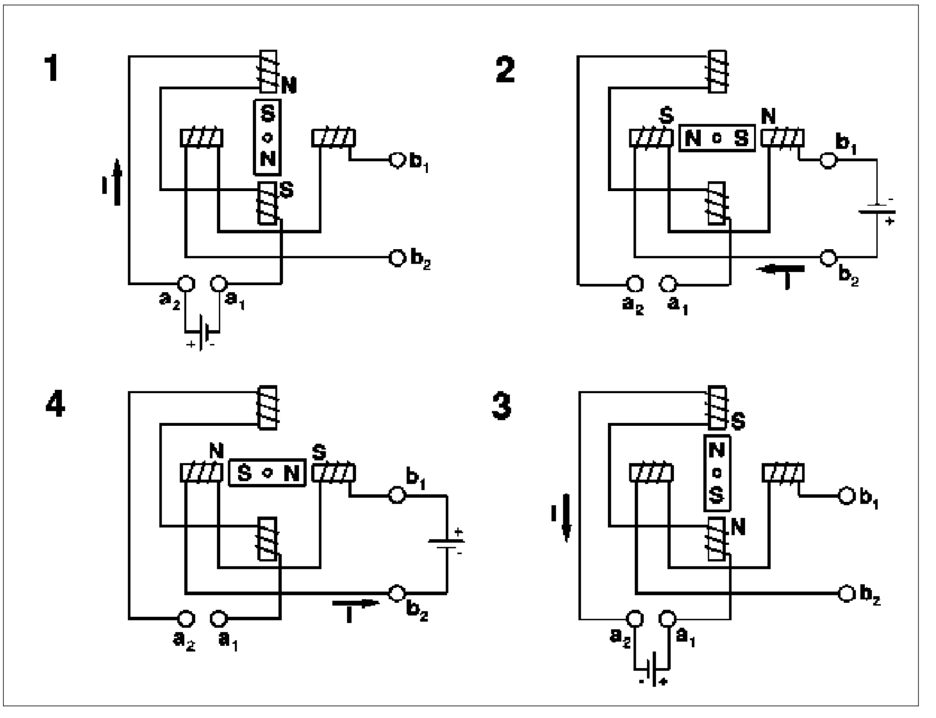
Stepper motors are motors which, like most electric motors, consist of a fixed stator and a moveable rotor. The rotary motion is not continuous, rather the rotor turns in steps, a certain angle at a time, for example 90°.

Design

The illustration shows the basic design of a stepper motor with 1 pole pair and 2 phases. The stator is made of magnetically soft iron and holds the windings. Opposite windings belong together and form a phase (in this case, a and b). The rotor consists of a permanent magnet. In the illustration the rotor has 1 pole pair.

Function

The rotor is turned by applying current through phase aor b (see illustration). The magnetism in the stator changes according to the polarization (I) of the phases.



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The rotor will turn so that its south pole (S) is at the north pole (N) of the stator and its north pole (N) is at the south pole (S) of the stator. The illustration shows a full rotation of the rotor. The rotor moves in steps of 90° from positions 1 through 4 and back to its starting position.
Unlike normal electric motors, the motor can stop in each of these positions with a certain holding torque. This type of motor is therefore particularly suitable for use as a servomotor for exact positioning.

The size of the steps can be reduced considerably by increasing the number of pole pairs and phases.
Theoretically, it is even possible to make the steps infinitely small with just a few poles and phases by using complicated electronic phase control (sine-cosine control).

Stepper motors (with sine-cosine control) are used, for example, for pointing instruments in the instrument cluster (A1).